Mars Scout
AO2002 Preproposal Conference

Introduction and Agenda

Dr. Ramon DePaula

May 20, 2002

Agenda

12:30 pm	Coffee/Registration	
1:00	Introduction and Agenda	Ramon DePaula
1:10	Welcome by MEP Director MEP Overview	Orlando Figueroa
1:20	Mars Scout Science Context	Jim Garvin
1:35	Mars Scout Implementation	Steve Matousek
1:50	Science Evaluation	Jim Garvin
2:05	Coffee Break	
2:20	AO Highlights and Process TMCO Evaluation	Wayne Richie
2:40	Q & A’s - Prior Questions - Questions from the Floor	Jim Garvin
3:50	Wrapup/Actions	Ramon DePaula

Introduction

o Welcome to Mars Scout AO 2002 PPC

Purpose of PPC: **To provide a direct interface with the community before NOI's/Proposals with goal of providing AO clarification to assure best quality proposals.**

NOTE: PPC is being transcripted; copies can be downloaded from the web in about 2 weeks at: http://centauri.larc.nasa.gov/mars/

o Agenda for Meeting

o Additional Points to be Made

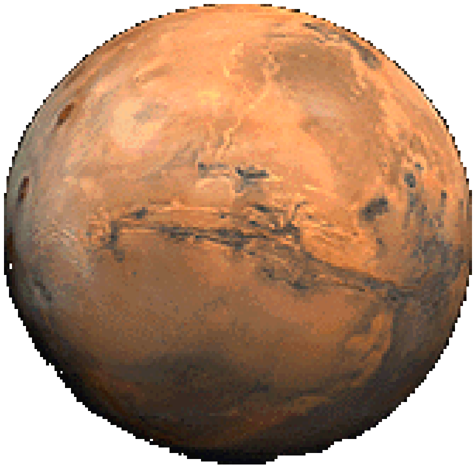
- Contact NASA Peer Review Service (NPRS) for any mechanics of submit: **proposals@nasaprs.com**

- Blackout following this conference: only point of contact /Dr. Jim Garvin
- Any changes necessary will be posted on the OSS and Scout Acquisition Homepage (see above and http://research.hq.nasa.gov/code_s/open.cfm

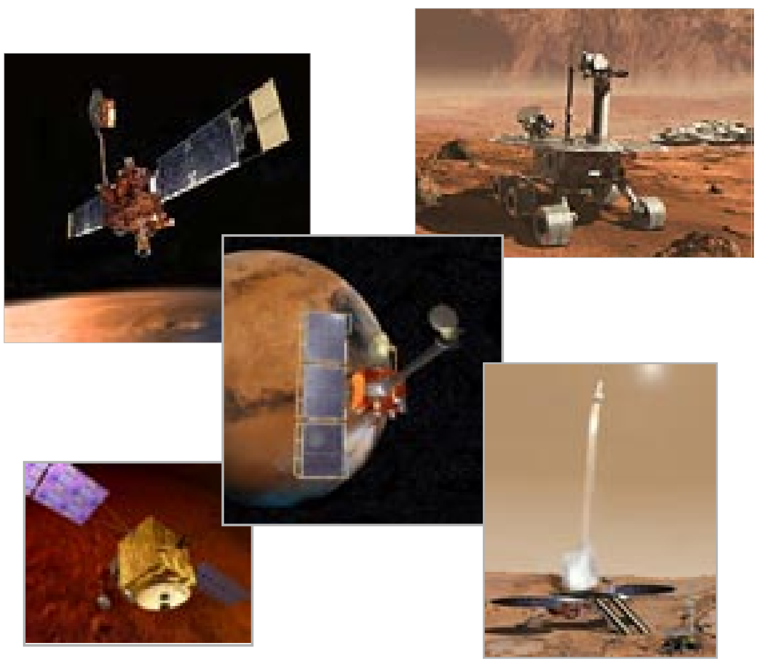
The Mars Exploration Program

Orlando Figueroa
Director, Mars Exploration Program
Office of Space Science

The Mars Exploration Program



A science-driven effort to characterize and understand Mars as a dynamic system, including its present and past environment, climate cycles, geology, and biological potential. ***A key question is whether life ever arose on Mars.***



Strategy: "Follow the Water"

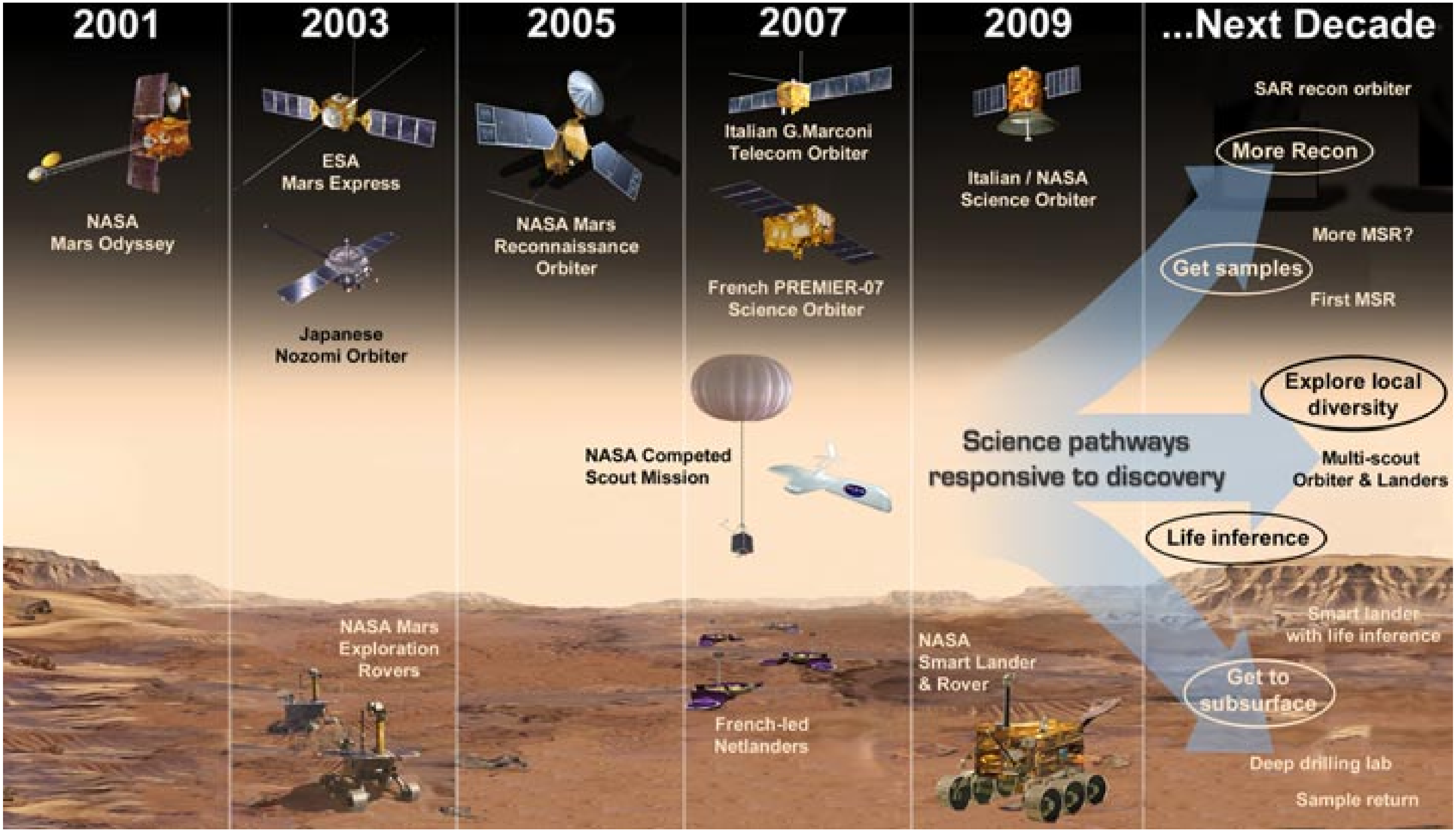
Search for sites on Mars with evidence of past or present water activity and with materials favorable for preserving either bio-signatures or life-hospitable environments

Approach: "Seek - In Situ - Sample"

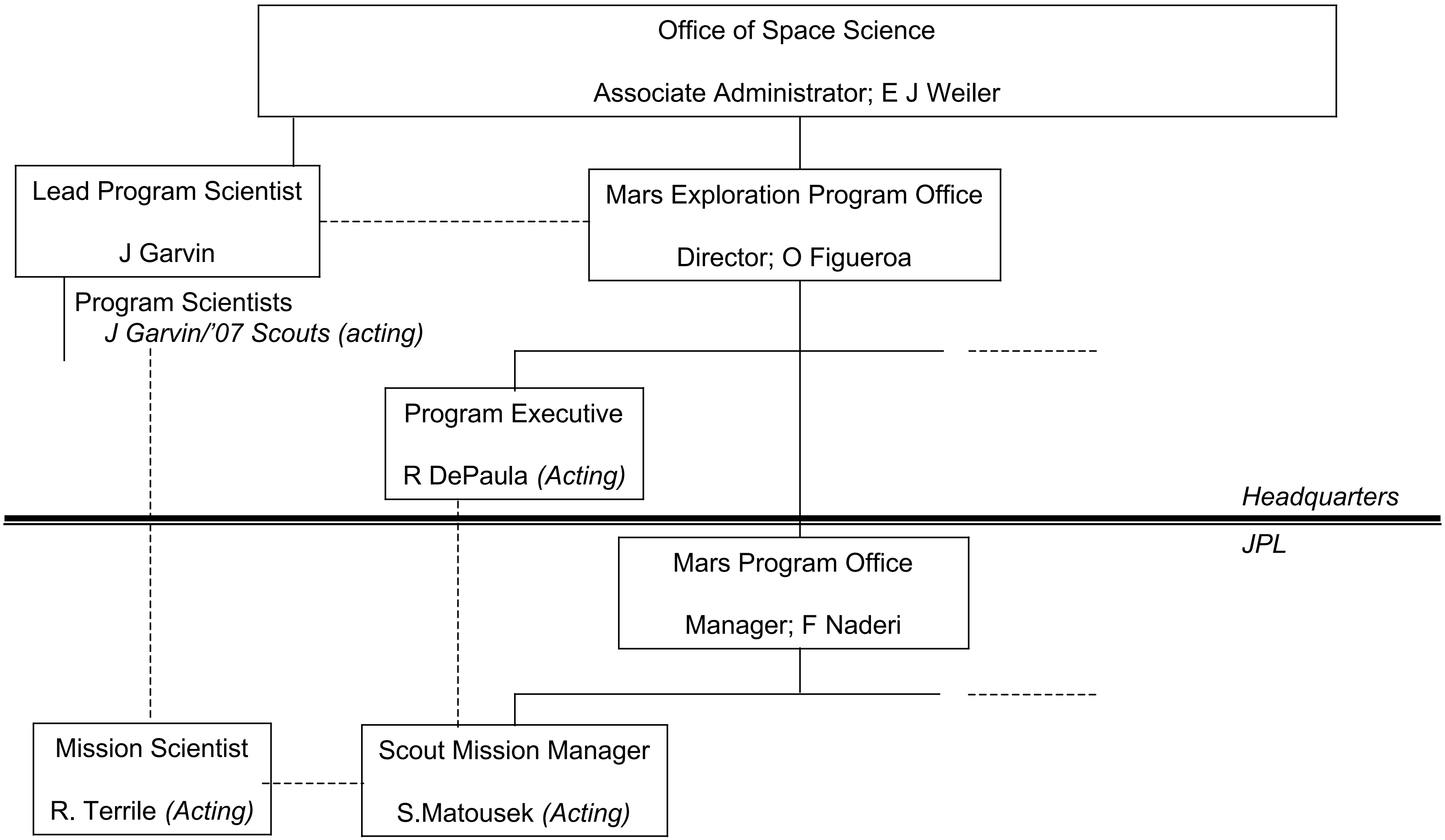
Orbiting and surface-based missions are interlinked to target the best sites for in-situ analytic measurements and sample sample return

Mars Exploration Program

Launch Year



Mars Exploration Program Organization



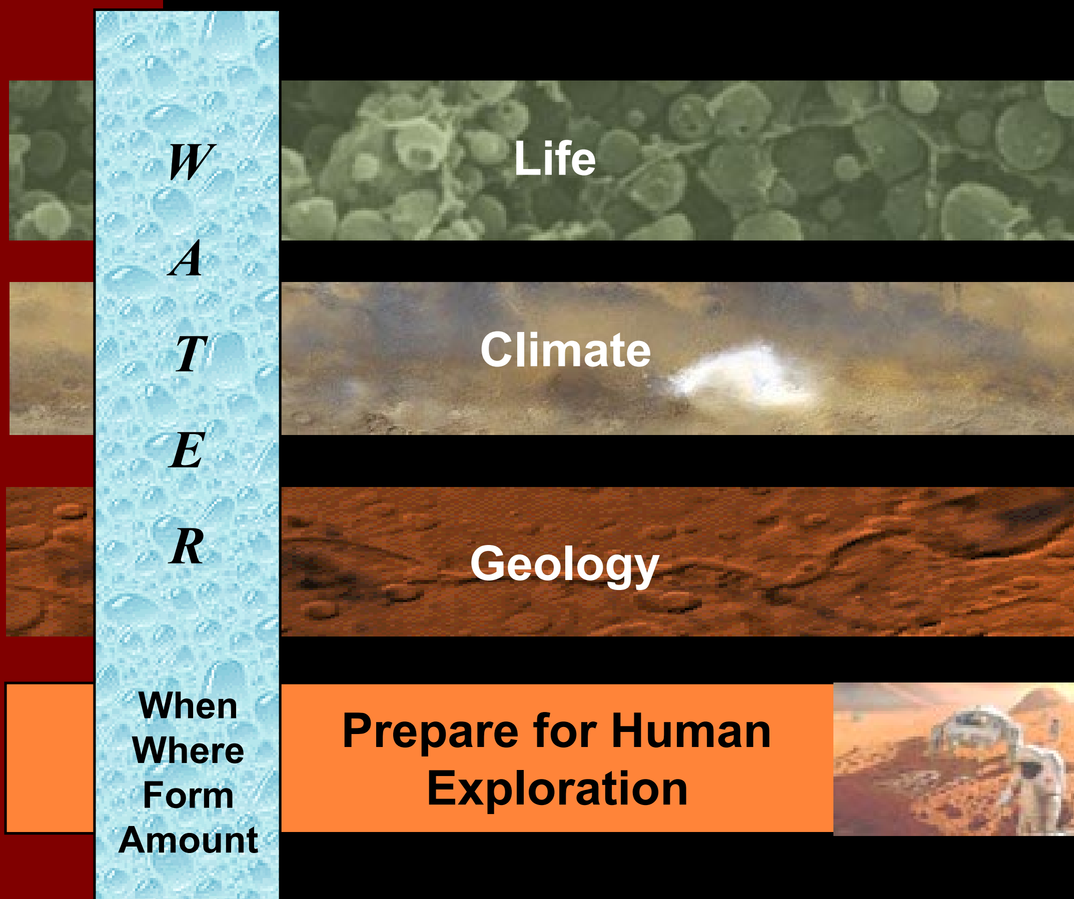
The Mars Exploration Program

Dr. Jim Garvin, Lead Scientist

NASA Mars Exploration Program

The Mars Science Strategy: "Follow the Water"

- When was it present on the surface?
- How much and where?
- Where did it go, leaving behind the features evident on the surface Mars?
- Did it persist long enough for life to have developed?



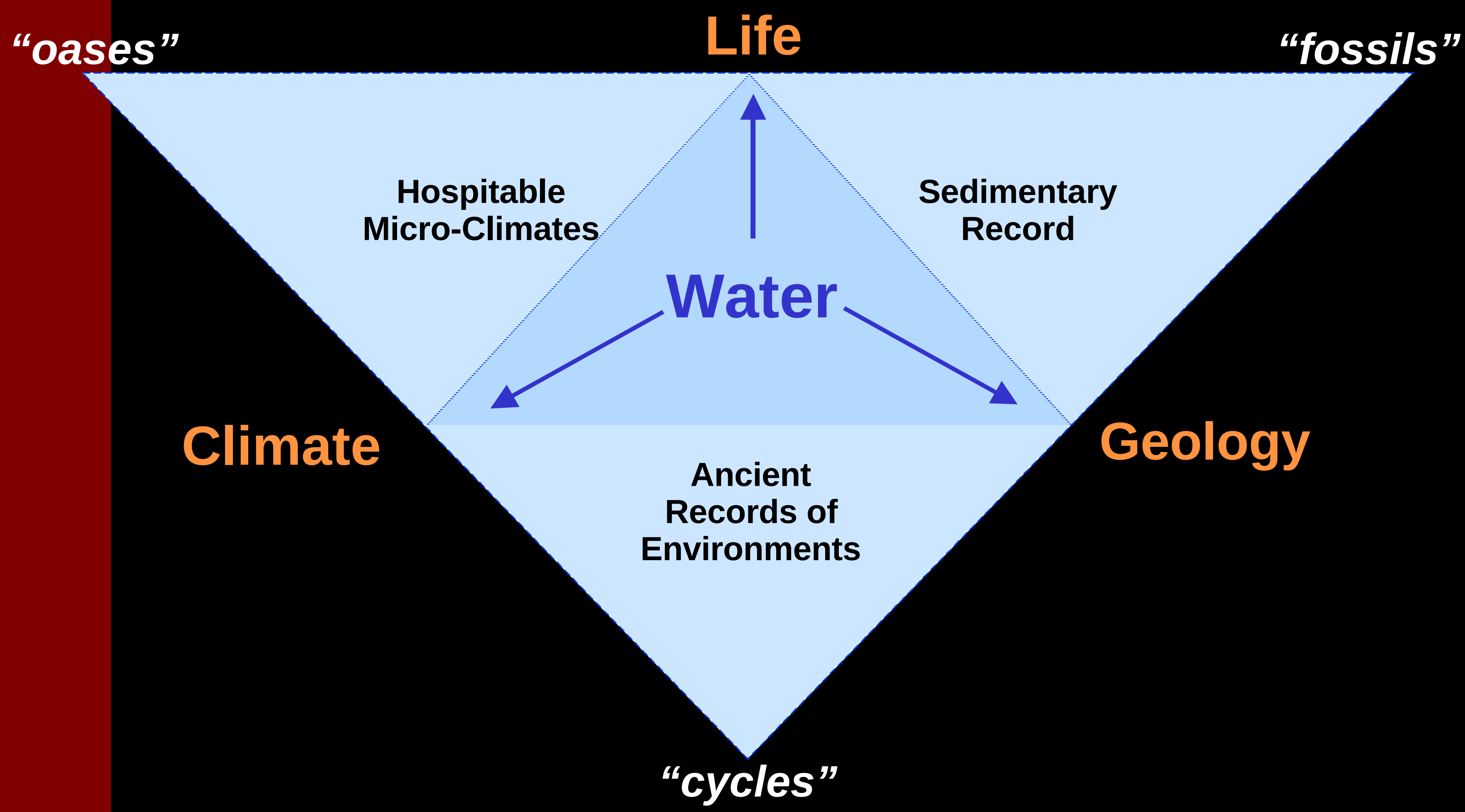
Understand the potential for life elsewhere in the Universe

Characterize the present and past climate and climate processes

Understand the geological processes affecting Mars' interior, crust, and surface

Develop Knowledge & Technology Necessary for Eventual Human Exploration

Mars: A Systems Science Approach



Mars Exploration Payload Analysis Group (MEPAG) Science Priorities

MARS INVESTIGATIONS (3. Clusters)

ORG	INVESTIGATION	ORB	SUR	SPL	PRIORITY	DIFFICULTY	SCORE
7	LOCATE AQUEOUS SEDIMENTS GLOBALLY	P				2	0
12	GLOBAL ATMOS CYCLING OF H2O, CO, CO2 AND DUST	P			1	2	2
1	GLOBAL MAP H2O AS ICE, VAP, LIQ, ADSORB, HYDRATE	P			1	3	3
20	PRESENT DISTRIBUTION/CRUSTAL CYCLING OF H2O	P			1	3	3
21	GLOBAL SEDIMENTARY GEOLOGY	P			1	3	3
1.5	LOCAL SOUNDING TO DEPTH H2O AS ICE AND LIQUID		P		1	3	3
12.5	ANNUAL ATMOS CYCLING OF H2O, CO, CO2, AND DUST		P		3	1	3
20.5	LOCAL SOUNDING TO DEPTH H2O AS ICE AND LIQUID		P		1	3	3
7.5	LOCATE AQUEOUS SEDIMENTS AT SURFACE		P		1	4	4
21.5	LOCAL SEDIMENTARY UNITS/PROCESSES		P		1	4	4
23	VOLCANIC PROCESSES AND THEIR GEOLOGIC RECORD	P	P		2	3	6
4	GLOBAL INVENTORY LIFE'S ENERGY SOURCES	P			2	3	6
13	MODERN ISOTOPIC CHEM OF ATMOSPH.		P		2	3	6
17	ANCIENT CLIMATE PHYSICAL CHEMICAL RECORDS			P	1	6	6
24	RECENT (1MY) EOLIAN/ATMOSPHERIC/POLAR PROCESS			P	2	3	6
16	FIND WARM/WET MICROCLIMATES	P			1	7	7
2	EXPLORE INSITU ACQUIFERS		P		1	7	7
18	POLAR STRATIGRAPHIC RECORDS OF CLIMATE			P	1	7	7
27	COMPOSITION/DISTRIBUTION OF CRUSTAL MATERIALS			P	1	7	7
14	SECULAR CHANGES ATMOSPH. TODAY	P	P		2	4	8
4.5	LOCAL CHARACTERIZE LIFE'S ENERGY SOURCES		P	P	2	4	8
30	HISTORY OF MAGNETIC FIELD	P		P	3	3	9
3	SEARCH ACQUIFER MATERIAL FOR LIFE		P	P	1	9	9
8	SEARCH FOR FOSSILS			P	1	9	9
19	HISTORY OF VOLCANIC/ IMPACT CLIMATE CONTROL			P	2	5	10
22	ABSOLUTE CHRONOLOGY OF CRUSTAL ROCKS			P	2	5	10
25	CRUSTAL STRUCTURE/STRATIGRAPHY/DICHOTOMY			P	2	5	10
15	PRESENT ATMOSPH. ESCAPE RATES	P			3	4	12
29	PRESENT INTERNAL STRUCTURE		P		2	6	12
10	FIND ORGANIC CARBON IN ICE/CRUST			P	2	6	12
5	FIND ORGANIC CARBON IN ICE/CRUST			P	2	7	14
11	HISTORY OF ORGANIC CARBON CRUST/ATMOSPHERE			P	2	7	14
31	THERMAL EVOLUTION OF INTERIOR-HEAT FLOW		P	P	3	5	15
6	GLOBAL MAP OF OXIDANTS IN SOIL				3	5	15
28	BULK COMPOSITION AND DIFFERENTIATION HISTORY			P	3	5	15
32	CHEMICAL/THERMAL EVOLUTION OF THE MANTLE			P	3	5	15
26	TECTONIC ACTIVITY CURRENT AND PAST		P	P	3	7	21
33	CURRENT RADIATION ENVIRONMENT		P		1	1	1
34	CURRENT TOXIDANT/IRRITANT LEVEL		P		1	1	1
35	CURRENT REACTIVITY/OXIDANT		P		2	1	2
42	PRECISION LANDING/HAZARD AVOIDANCE DEMO		P		1	2	2
43	AEROENTRY/AEROCAPTURE FLIGHT DEMO		P		1	2	2
38	VARIANCE IN ATMOSPHERE AFFECTING FLIGHT		P		3	1	3
45	IN-SITU PROPELLANT PRODUCTION DEMO		P		1	3	3
37	CURRENTLY ACCESSIBLE WATER		P		1	5	5
39	ELECTRIC/ELECTROSTATIC ATMOSPHERIC CONDITIONS		P		3	2	6
44	HIGH-MACH PARACHUTE DEMO		P		2	3	6
49	DEVELOP HIGH CAPCITY COMM SYSTEMS		P		2	3	6
36	CURRENT BIOHAZARDS		s	P	2	5	10
46	IN-SITU WATER EXTRACTION DEMO		P		2	5	10
51	DEVELOP DRILLING SYSTEMS		P		2	5	10
40	RADIATION SHIELDING ABILITY OF REGOLITH		P		3	4	12
41	ABILITY OF MARTIAN SOIL TO GROW PLANTS		s	P	3	4	12
47	DEVELOP DEEP DRILLING		P		3	5	15
48	DEVELOP HIGH CAPCITY POWER SYSTEMS		P		3	5	15
50	DEVELOP PRECISION LANDING INFRASTRUCTURE (GPS)		P		3	5	15

LIFE CLIMATE GEOLOGY PREPARE

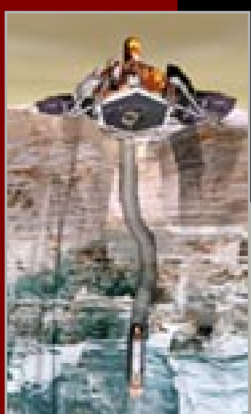
LOW SCORE = DO SOONER HIGH SCORE = DO LATER

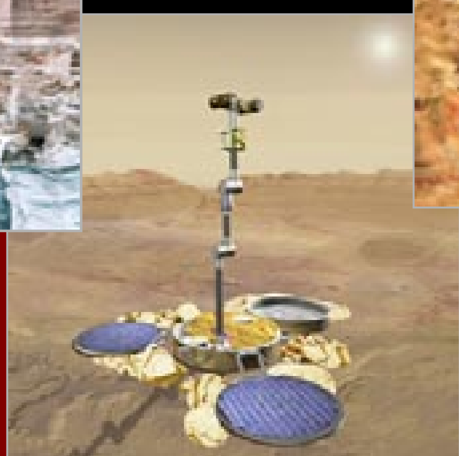
7: GREELEY (9/00)

2007 Competed Scout Mission

Incorporate into the Mars Exploration Program innovations in science, measurement systems, and mission concepts.

- **Utilize a competitive process to select scientist-led missions**





Orbital/Constellation, Surface Network, Aerial Reconnaissance, Surface/Subsurface Science

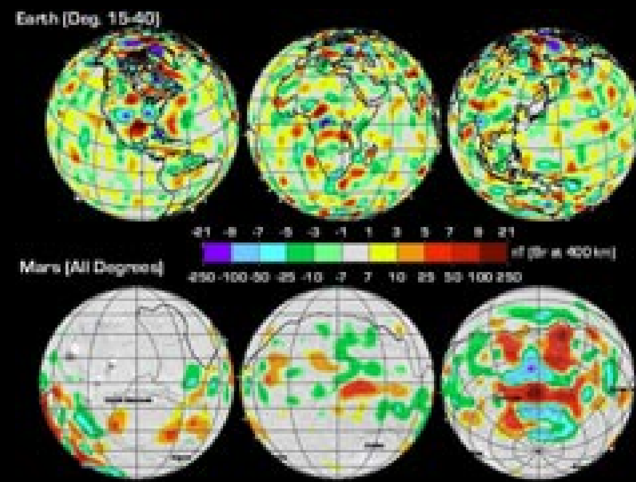
Example of Science Traceability

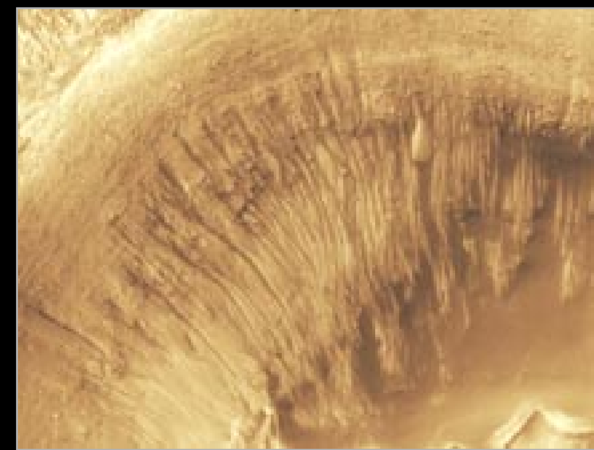
2001 Mars Odyssey

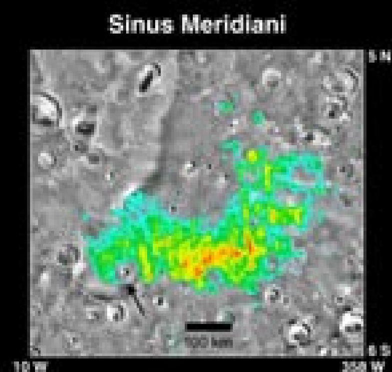
GOAL:	INVESTIGATION:	MEASUREMENTS:	INSTRUMENTS:
Life	Explore **sedimentary layers** (likely habitat of ancient Martian life).	imaging	THEMIS
		mineralogy	THEMIS
		geochemistry	GRS
	Locate geothermally "hot" spots/possible habitats of Martian life*.	imaging	THEMIS
Climate	Find physical and chemical records of **past climates**.	shallow subsurface water ice	GRS
		mineralogy	THEMIS
		trace elements	GRS
Geology	Locate and measure **water-bearing minerals**.	mineralogy	THEMIS
	Characterize large-scale **morphologic properties***.	vis-IR imaging	THEMIS
	Determine the present state, distribution and cycling of **water.**	shallow subsurface water ice	GRS
Preparation for Human Exploration	Analyze the **radiation** environment.	radiation in transit to Mars	MARIE
		radiation at Mars	MARIE

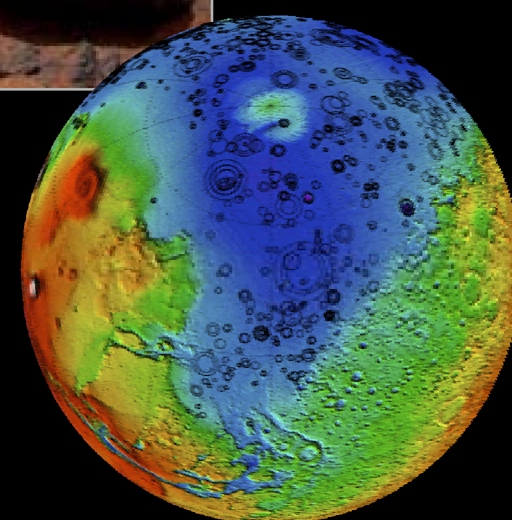
* Not specifically a MEPAG Priority #1 Goal, Investigation or Measurement

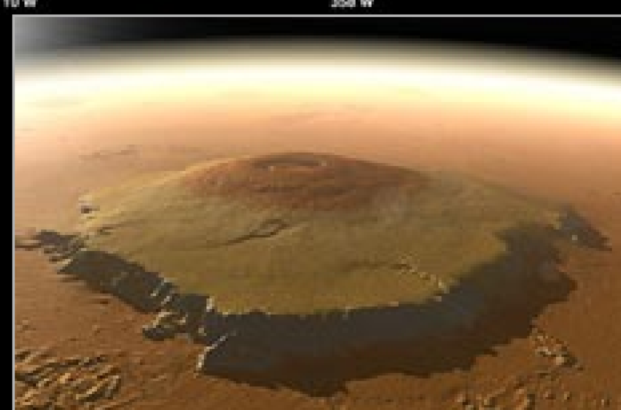
Recent Discoveries to Follow Up On…



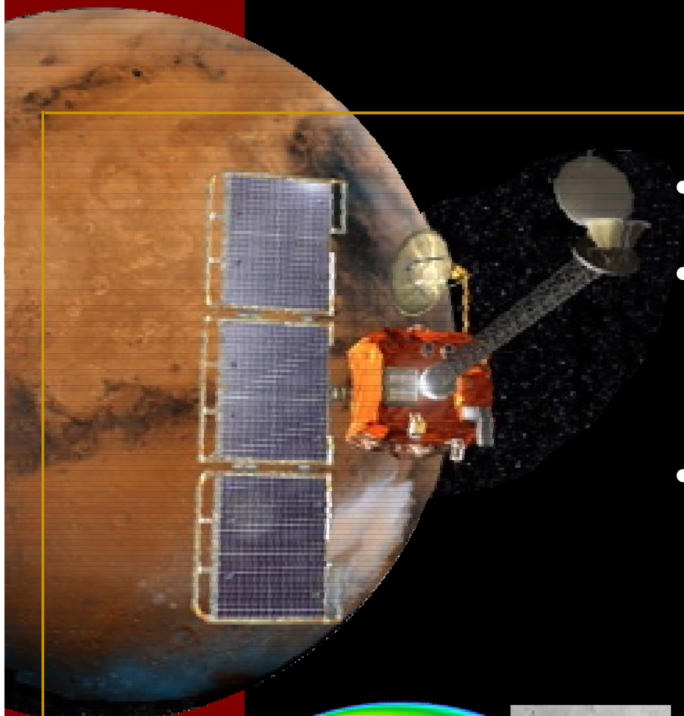




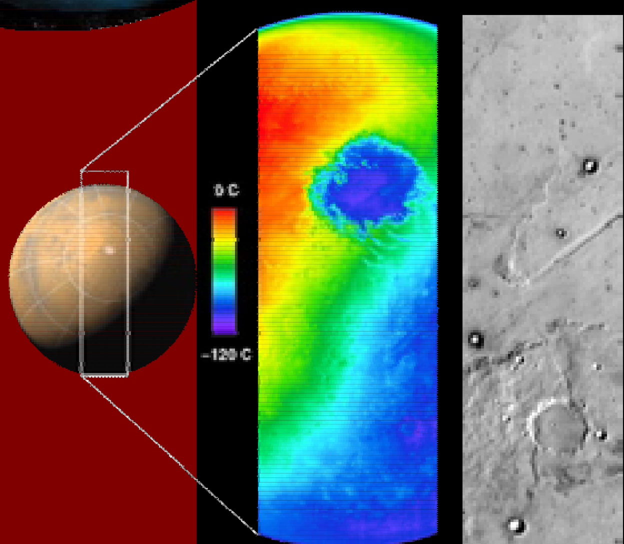




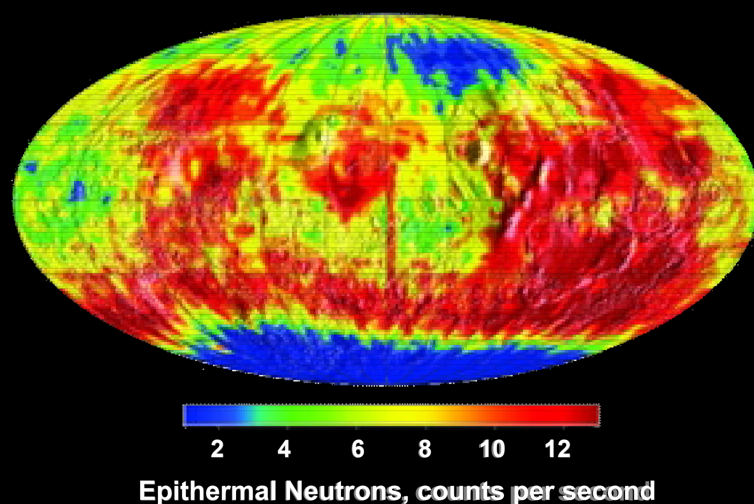
2001 Mars Odyssey



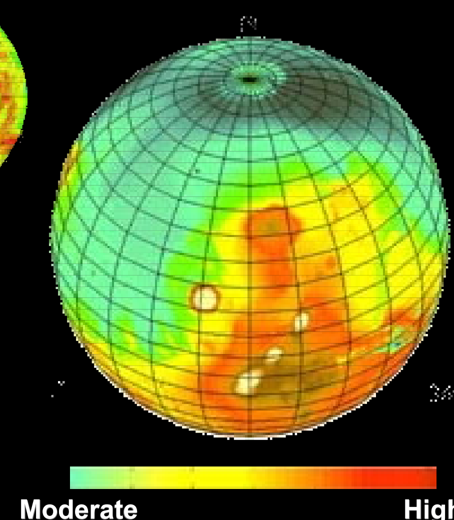
- Map the mineralogy and morphology of the surface
- Map the elemental composition of the surface and determine abundance of hydrogen in the shallow subsurface
- Measure the near-space radiation environment



Thermal Imaging (THEMIS)



Hydrogen Concentrations
(Gamma Ray Spectrometer)

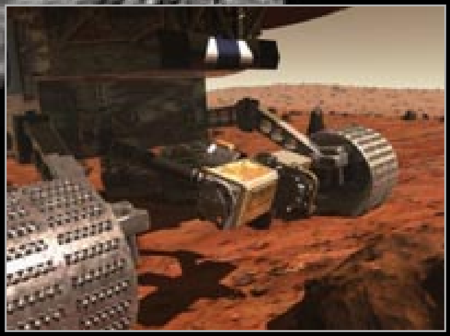


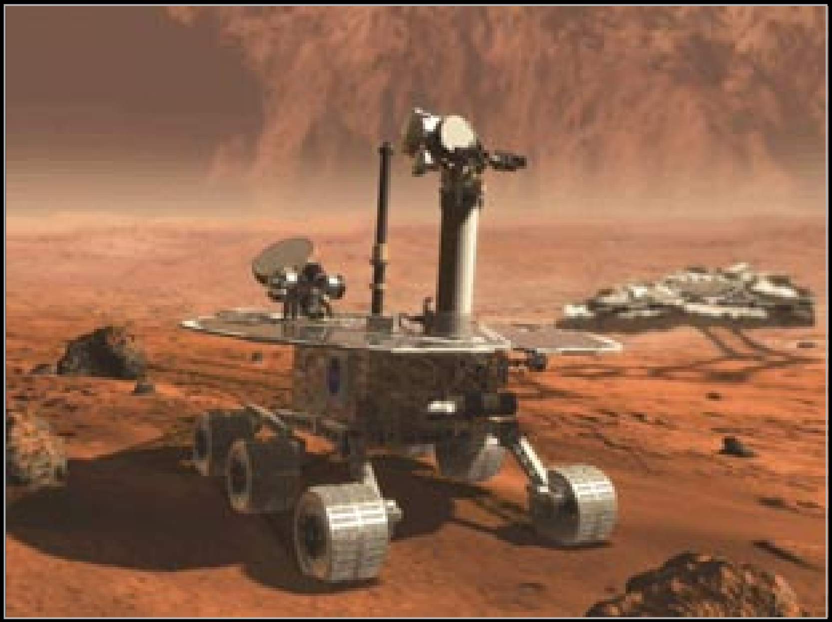
Cosmic Ray Environment
(MARIE)

2003 Mars Exploration Rovers

- Will learn about the climate on Mars and scout for regions where mineralogical evidence of water has been found.
- The rover twins will determine the geologic record of the landing site, what the planet's conditions were like when the Martian rocks and soils were formed, and help us learn about ancient water reservoirs.

First microscopic view of Mars





Rover 1: Launch: May 30, 2003
Landing: January 4, 2004

Rover 2: Launch: June 27, 2003
Landing: January 25, 2004

2005 Mars Reconnaissance Orbiter

- High resolution imaging and mineralogic characterization of the surface
- Recovers the Mars Climate Orbiter climatology investigations for atmospheric sounding and context imaging
- Searches for mineralogic and morphologic evidence of water-related processes on a targeted, global basis

Hyperspectral Imaging (Visible/Near Infrared)

Mauna Kea summit, Hawaii

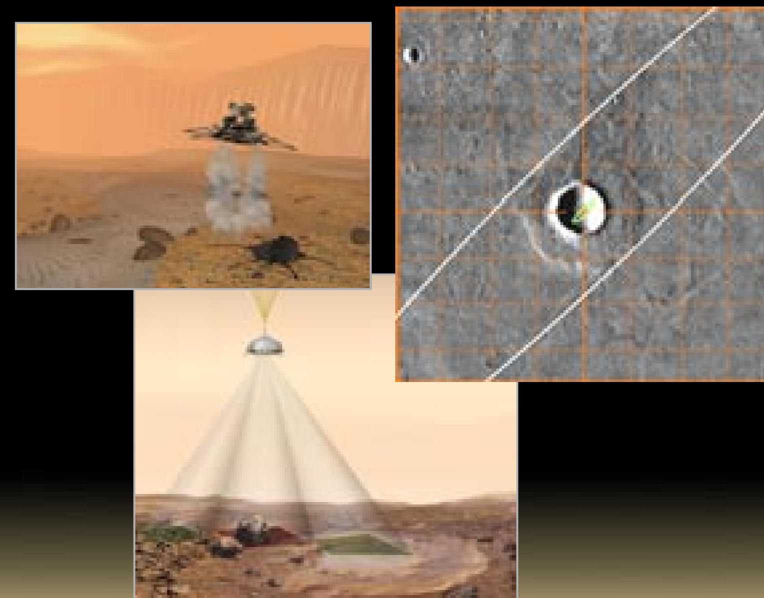
MGS Resolution (approx. 3 m / pixel)

Surtsey Island, Iceland

MRO Resolution (approx. 25 cm / pixel)

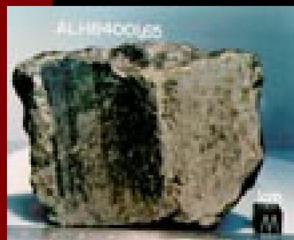
2009 Mobile Science Laboratory

- State of the art in-situ science and life inference experiments
- Utilize precision entry, descent, & landing and active hazard avoidance
- Incorporate radioisotope power source for long-range, long-duration science
- Validate rover design and long-life operations for future surface missions



Mars Meteorite Gallery

Allan Hills 84001



Allan Hills 77005

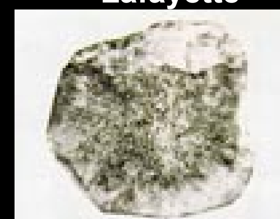
Chassigny

EETA 79001

Governador Valadaros

Los Angeles 001

Lafayette



LEW 88516

Nakhla

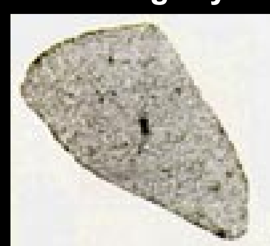
Northwest Africa 480

Northwest Africa 817

QUE 94201

Dar al Gani 476

Shergotty



Zagami

Not Shown:

- Dhofar 019
- Sayh al Uhaymir 005
- Yamato 793605

First Mars Scout

- Science must be traceable to MEPAG and COMPLEX priorities and gaps
- Science observations should NOT duplicate the NASA Core Program or plans by International colleagues (ESA, CNES, Japan, Russia)
- Science COULD provide needed FOUNDATION datasets, Gap fillers, or respond to MGS, Odyssey findings
- Science content should demonstrate how present state of knowledge will be quantitatively improved via the mission proposed
- "Following the Water" science theme is encouraged but not absolutely required

Summary

- Mars Scout Science Content and Merit is a key criterion in the Step 1 evaluation
- Science that extends knowledge of Mars from new vantage points encouraged
- Science measurements that respond to discoveries by MGS, Odyssey are encouraged
- Science scope should be appropriate to level of resources available
- Science RISK (i.e, risk of making the required measurements) should be factored into mission considerations
- Delivery of calibrated and validated scientific datasets is key product

Mars Scout

AO2002 Preproposal Conference

Mars Scout Implementation

Steve Matousek

May 20, 2002

Mars Scout Management

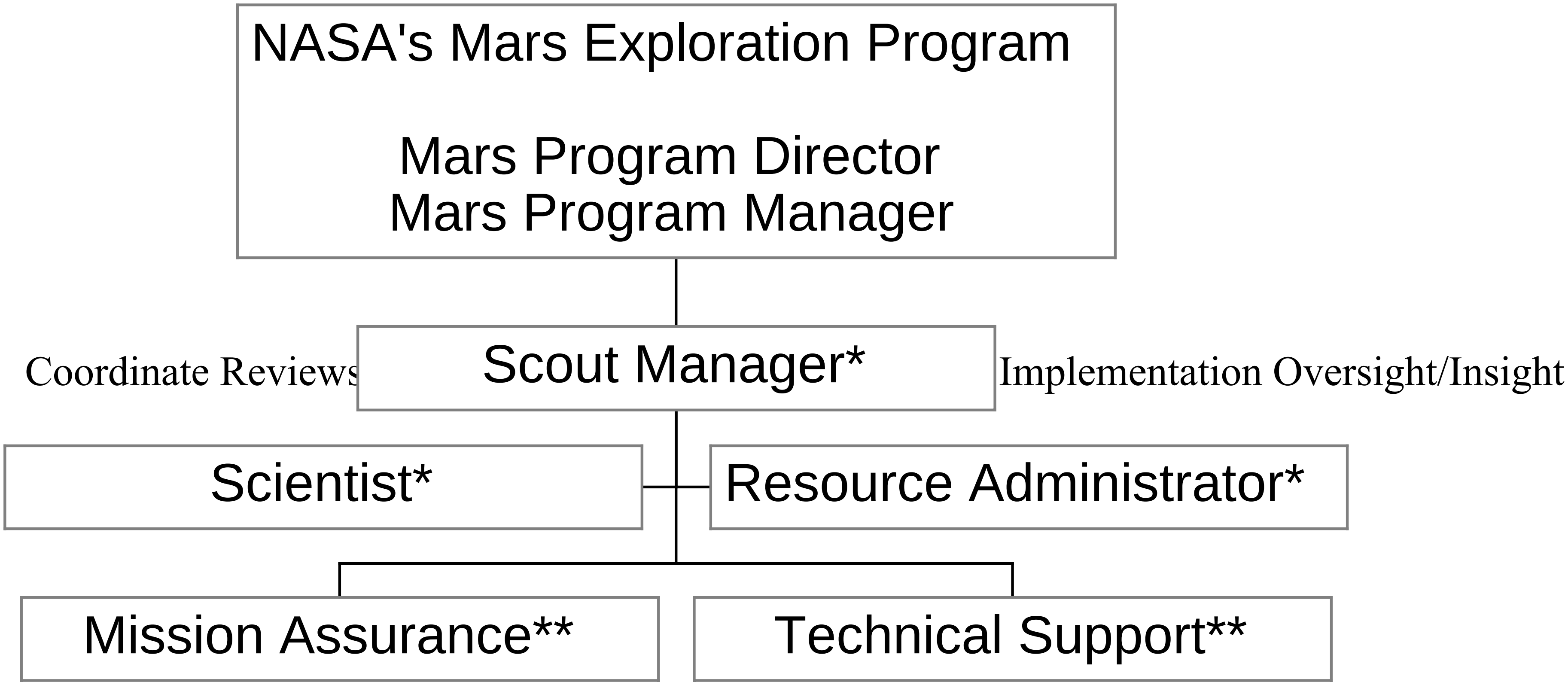
MPO Mars Scout Manager will:

- Oversee Mission Implementation
- Coordinate Government Furnished Services, Equipment, and Facilities
- Manage Contracts of Selected Investigations
- Coordinate Independent Reviews at Major Project Reviews (for example PDR and CDR)

What to Expect After Step 1

- **Scout Management Office will be visible and accessible, similar to Discovery management office**
- **Act as interface to MEP**
- **Enable fast start of required contracts**
  - Step 2
  - Selected flight investigations
- **Ensure adherence to 7120.5 (tailored for Code S)**
  - incremental funding with clear milestones (PDR, CDR, etc.)
- **Conduct monthly status telecon/videocon, quarterly face-to-face progress reports**

Draft Scout Mngmt Office Org



* denotes full time

** denotes 1/2 time

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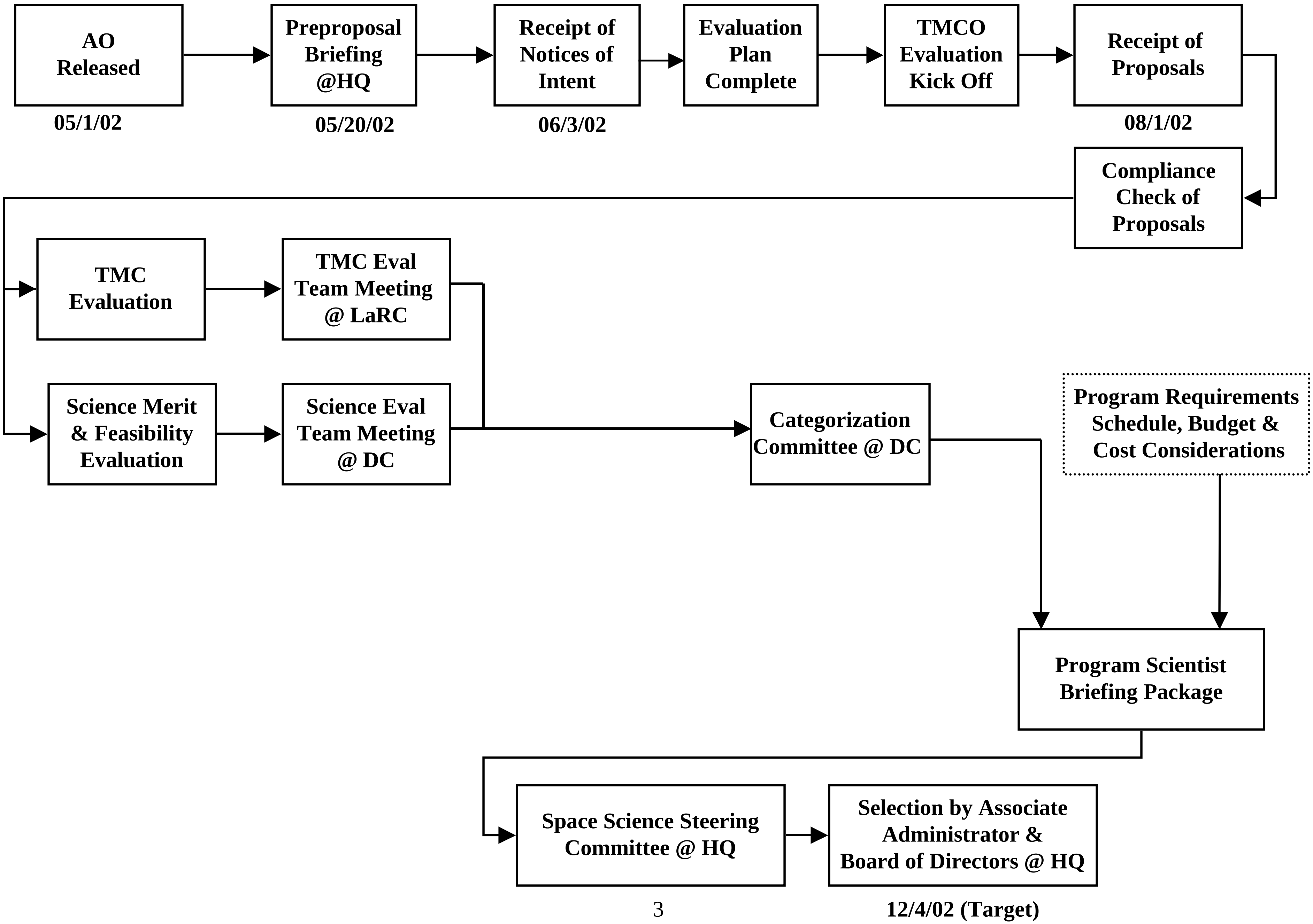
AO2002 Preproposal Conference

Science Evaluation and Process

Dr. James Garvin

May 20, 2002

Mars Scout 2002 Proposal Evaluation Process



Proposal Evaluation Criteria

Proposals are evaluated using the 3 criteria from AO (Section 7.2) and all are of approximately equal weight:

- **The Scientific merit of the investigation**
- **Technical merit and feasibility of the science investigation**
- **Feasibility of the mission implementation including Cost Risk**

The proposed Total Cost to OSS is an important consideration for each investigation and this value is capped in the AO. This proposed cost cannot grow by more than the cost cap or 20% during Downselection at which time the cost will be fully evaluated.

Plans and commitment for NASA's Education/Public Outreach, Technology Infusion/Transfer, and Small Disadvantaged Business programs are important elements of the overall investigation and are factors which will be considered at Selection. Detailed implementation planning for these will be evaluated during Downselection.

CATEGORIZATION PROCESS

CATEGORIZATION OF PROPOSALS (NFSD 1872.403)

CATEGORY I: Well conceived and scientifically and technically sound investigations pertinent to the goals of the program and the AO's objectives and offered by a competent investigator from an institution capable of supplying the necessary support to ensure that any essential flight hardware or other support can be delivered on time and that data can be properly reduced, analyzed, interpreted, and published in a reasonable time. Investigations in Category I are recommended for acceptance and normally will be displaced only by other Category I investigations.

CATEGORY II: Well conceived and scientifically or technically sound investigations which are recommended for acceptance, but at a lower priority than Category I.

CATEGORY III: Scientifically or technically sound investigations which require further development. Category III investigations may be funded for development and may be reconsidered at a later time for the same or other opportunities.

CATEGORY IV: Proposed investigations which are recommended for rejection for the particular opportunity under consideration, whatever the reason.

AO Options and Evaluation Expectations

Degree to which proposals demonstrate Scientific Merit and Technical Merit and Feasibility result in grades ranging from BEST=9 to WORST=1.

Mission Investigations

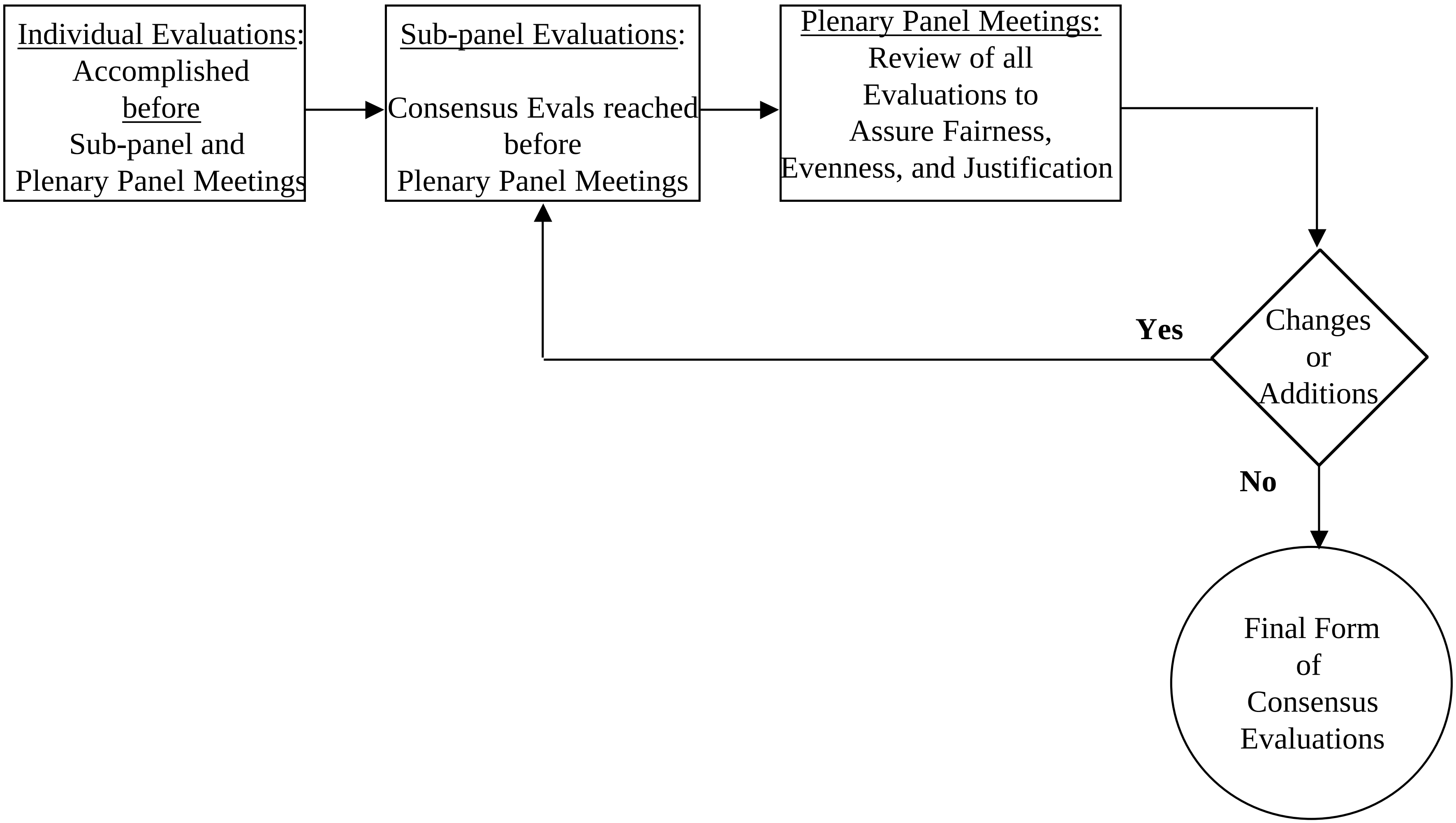
- Scientific Merit
  - -fill gaps for Mars science
  - -progress on MEP goals
  - -spt/complement other MEP missions
  - -value of science floor
- Tech Merit and Feasibility
  - -science team and quals
  - -right instruments for data
  - -adequate data
  - -data analysis/archive plan
  - -investigation resilience
  - -speed data to public domain

Missions of Opportunity

- Scientific Merit
  - -fill gaps for Mars science
  - -progress on MEP goals
  - -spt/complement other MEP missions
  - -value of science floor
- Tech Merit and Feasibility
  - -science team and quals
  - -right instruments for data
  - -adequate data
  - -data analysis/archive plan
  - -investigation resilience
  - -speed data to public domain

Science Review and Evaluation Process

Science Panel Flow



Science Evaluation Principles

- Selection of high-quality scientific investigations that assure the highest science value for cost.
- Selection of scientific investigations consistent with the MEP Strategic Planning.
- To evaluate smaller, lower cost, focused missions on an equal footing with larger, higher cost, wide scope missions.

- Basic Assumptions:
  - That proposer is proposing <u>science missions</u> with conservative development efforts required.
  - That proposer has adequate contingency and reserves to accomplish the mission (do not expect overrun bailout)
  - Investigations that cannot maintain schedule, budget, and scientific requirements are subject to cancellation.

Science Evaluation Factors

Scientific Merit:

- How well does the mission fill important gaps in knowledge and/or provide for fundamental progress in planetary system(s) science?
- Does the proposed investigation support or complement ongoing missions or provide ancillary benefits to planetary system(s) science?
- At the performance floor, will the investigation still have high scientific value?

Technical Merit and Feasibility:

- Can the proposed investigation approach (measurement objectives, data analysis, etc.) be expected to achieve the proposed scientific goals and objectives?
- Does the science investigation team have the appropriate expertise, experience, and organizational structure to successfully complete the proposed investigation ?
- Will the proposed instrumentation support the measurement objectives of the investigation (appropriate type of data with necessary resolution, dynamic range, sensitivity, SNR, etc.)?
- Will the volume of data (or quantity of samples) returned be sufficient to complete the investigation?

Science Evaluation Factors (continued)

Technical Merit and Feasibility: (continued)

- Resiliency: In the event of development problems, will the proposed descoping plan permit "graceful degradation" to performance floor?
- Data analysis and archiving: Is there an approach for designing and delivering standardized (PDS) data products? Will data (or samples) be released to the public domain in a timely fashion? Does the data analysis plan specifically include physical interpretation and publication of results in refereed journals? Are there adequate resources to accomplish these tasks?

Science Evaluation Process

- **Science Evaluators are:**
  - Best (non-conflicted) academic, CS, contractor, consultant, and other government agency personnel available to support the review
  - Peers in the areas of expertise they evaluate
  - External reviewers for all proposals for a particular area of specialty and provide findings but do not participate in final ratings

- **Science Findings:** Are the consensus of the entire panel
  - Every proposal evaluated by a subpanel team composed of multiple reviewers with a mixture of discipline expertise (at least 3 of whom have read each proposal)
  - After subpanel consensus, all proposals and findings discussed by the entire panel (many people)
  - Final ratings are agreed to in plenary

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AO Highlights and Process
TMCO Proposal Review & Evaluation Process

Wayne Richie

May 20, 2002

AO HIGHLIGHTS

- **Two-Phase, One-Step Procurement**
  - Phase I: Solicit science proposals with sufficient implementation information to evaluate risk, expected total cost to NASA, and commitment to other programmatic goals. Select approximately 4 proposals and award contracts for Phase A Concept Studies, with contract options for Phase B, Phase C/D, and Phase E. (A Mission of Opportunity could be selected for implementation at this point.)
  - Phase II: Evaluate Concept Study Reports, and downselect to one investigation for implementation.
- **All Investigations must support the Mars Exploration Program science themes per AO.**

AO HIGHLIGHTS
What Are the Standard features of this AO?

- Investigations are PI-led
- Mission Investigations are for complete womb to tomb efforts
- Missions of Opportunity are for US investigations on a non-Code S mission.
- ELV must either be NASA provided or be contributed.
- Contributions encouraged but are limited to 1/3 of the Total cost to OSS
- Mission phases may continue to be broken into Phase A, B, C, D, and E since NPG 7120.5A does not prohibit.
- No RTG's but limited quantities of nuclear material (RHU's) OK
- All Scout investigation data is non-proprietary and must be entered asap into the PDS and made available to the community.
- All investigations must include overall planning and commitment to NASA's E/PO, SDB, and Tech Infusion/Transfer programs.

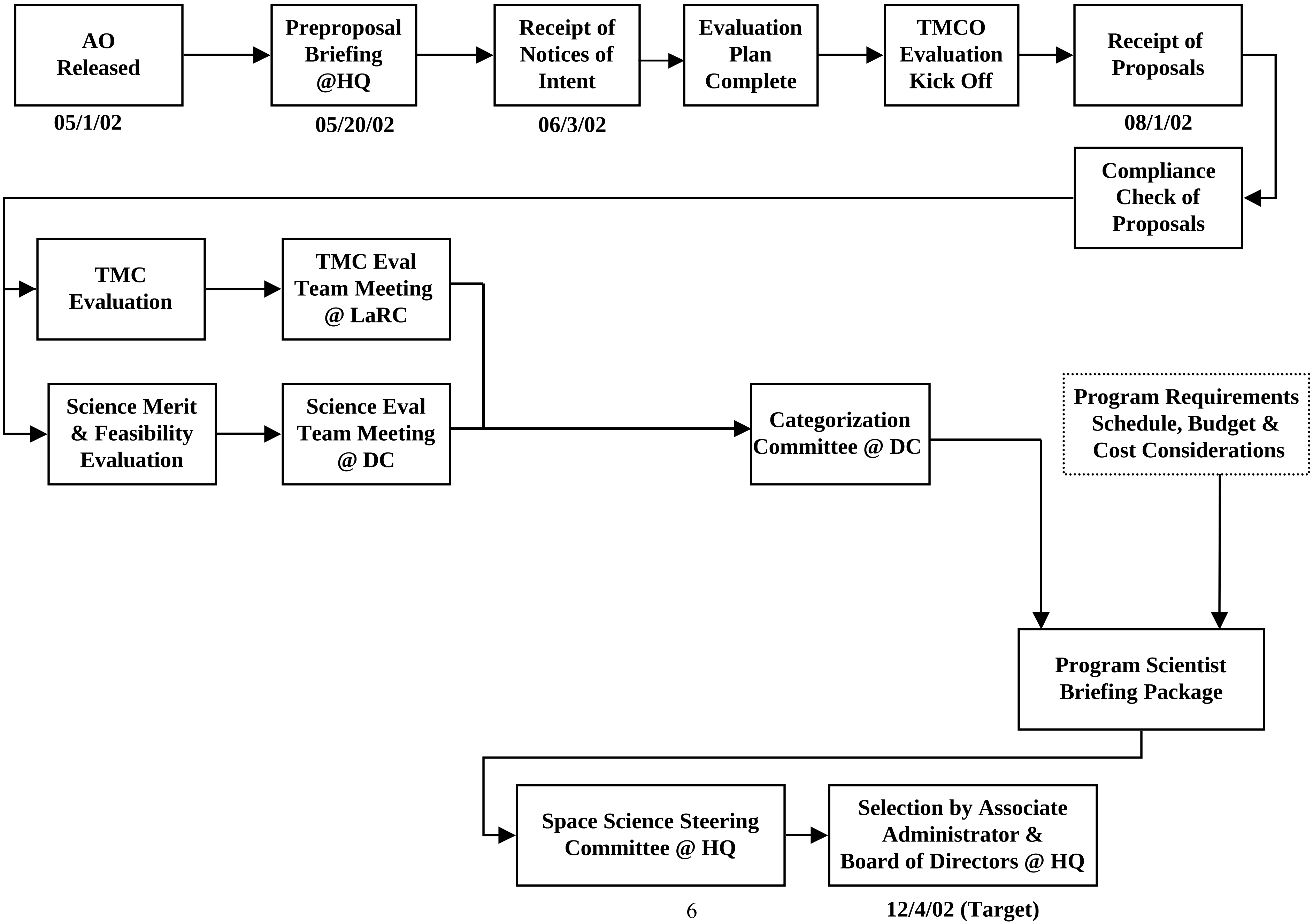
AO HIGHLIGHTS
What's Unique to this AO?

- OSS Cost Cap: $325M FY 03 for full missions
- Missions of Opportunity cost cap: $25M FY 03
- Mission launch date nlt December 31, 2007
- Missions of Opportunity must require NASA commitment before December 31, 2003
- Project Management may be from any element of the investigation team, however, if it is to be provided by NASA, it must be from either JPL or GSFC.
- Orbital missions of 1 year or more MUST include a MEP-provided UHF communications package.
- Investigations must interface with and be compatible with MEP planned missions and architecture.
- Program Management is located at JPL.

AO HIGHLIGHTS
What's New in this AO?

- Participating Scientist Program (PSP), Data Analysis Program (DAP), and extended missions ARE NOT solicited by this AO.
- The Education and Public Outreach Programs of investigations that are Selected will be assessed and findings provided before Concept Study Report activities begin.

Mars Scout 2002 Proposal Evaluation Process



Proposal Evaluation Criteria

Proposals are evaluated using the 3 criteria from AO (Section 7.2) and all are of approximately equal weight:

- **The Scientific merit of the investigation**
- **Technical merit and feasibility of the science investigation**
- **Feasibility of the mission implementation including Cost Risk**

The proposed Total Cost to OSS is an important consideration for each investigation and this value is capped in the AO. This proposed cost cannot grow by more than the cost cap or 20% during Downselection at which time the cost will be fully evaluated.

Plans and commitment for NASA's Education/Public Outreach, Technology Infusion/Transfer, and Small Disadvantaged Business programs are important elements of the overall investigation and are factors which will be considered at Selection. Detailed implementation planning for these will be evaluated during Downselection.

CATEGORIZATION PROCESS

CATEGORIZATION OF PROPOSALS
(NFSD 1872.403)

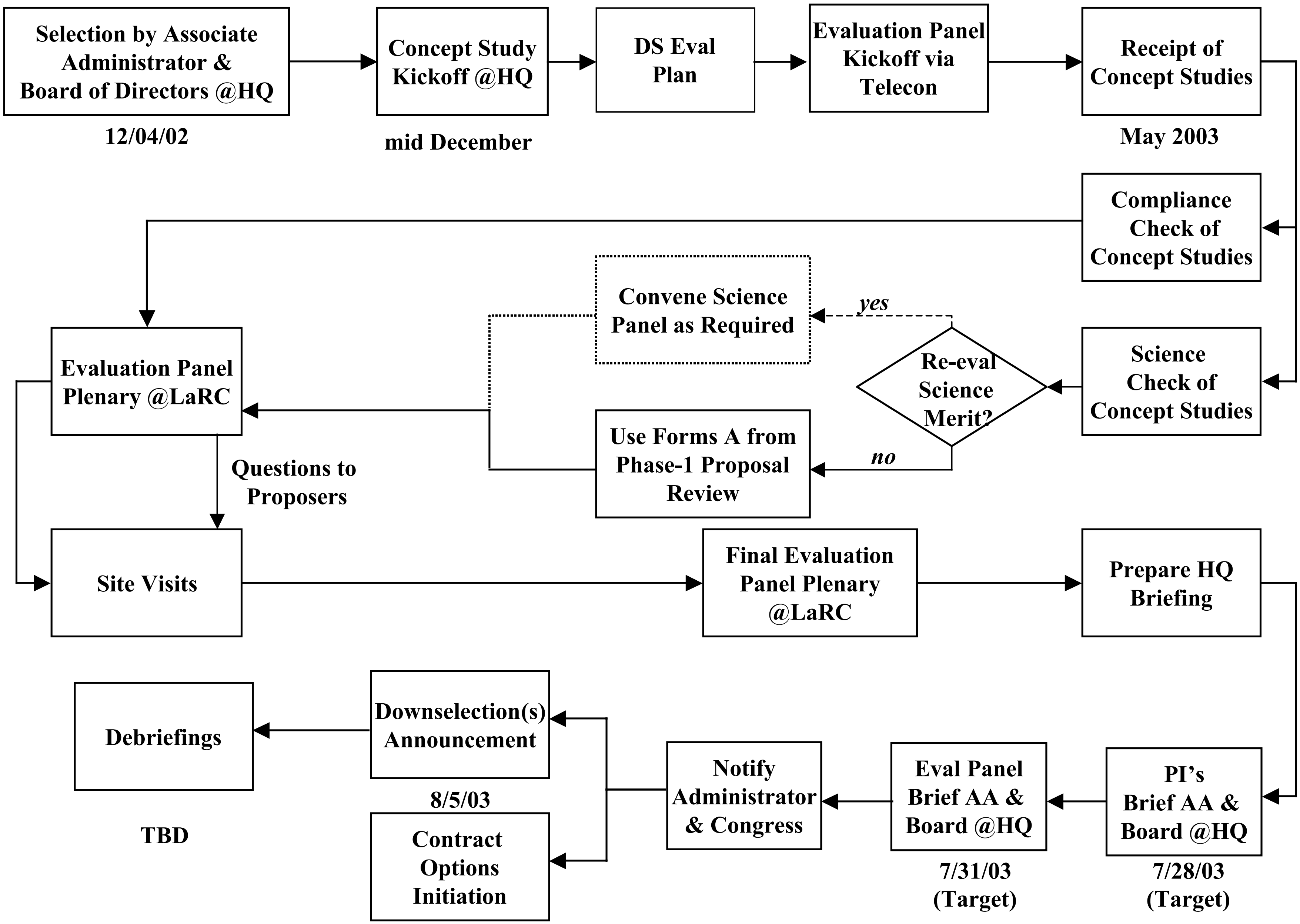
CATEGORY I: Well conceived and scientifically and technically sound investigations pertinent to the goals of the program and the AO's objectives and offered by a competent investigator from an institution capable of supplying the necessary support to ensure that any essential flight hardware or other support can be delivered on time and that data can be properly reduced, analyzed, interpreted, and published in a reasonable time. Investigations in Category I are recommended for acceptance and normally will be displaced only by other Category I investigations.

CATEGORY II: Well conceived and scientifically or technically sound investigations which are recommended for acceptance, but at a lower priority than Category I.

CATEGORY III: Scientifically or technically sound investigations which require further development. Category III investigations may be funded for development and may be reconsidered at a later time for the same or other opportunities.

CATEGORY IV: Proposed investigations which are recommended for rejection for the particular opportunity under consideration, whatever the reason.

Scout Downselect Schedule/Evaluation Flow



Space Science Mission Risk

Risks For Space Science Missions

Inherent Risks of Missions

Risks that are unavoidable to do the mission:

- Launch environments
- Space environments
- Mission durations
- Technologies or technology extensions
- Unknowns
- etc.

Programmatic Risks of Missions

Risks that are uncertainties due to matters beyond project control:

- Environmental Assessment approvals
- Budgetary uncertainties
- Political impacts
- Late/non-delivery of NASA provided project elements
- etc.

Implementation Risks of Missions (Evaluated by TMCO)

Risks that are associated with implementing the mission:

- Adequacy of planning
- Adequacy of management
- Adequacy of development approach
- Adequacy of schedule
- Adequacy of funding
- Adequacy of Risk Management (planning for the known and unknown)

TMCO RISK ANALYSIS

Phase I Proposal Risk Assessment:

- Selection based primarily on Science
- TMCO risk assessment high level on a *preliminary concept* with some benefit of doubt given to proposers.
- Cost Analysis done without proposer feedback and integrated into overall risk.
- Goal: No High Risk proposals but accept Med-Low if Science is compelling.
- Concern: Phase II might find proposals too risky.

Phase II Concept Study Risk Assessment:

- Science selection has been completed.
- Risk of Implementation assessment now done at a lower level and on an *advanced concept* with some proposer feedback (all major concerns addressed by proposers at oral briefings during a Site Visit)
- Cost Risk analysis integrated into total risk assessment but is also highlighted separately for consideration.
- Goal: Give Selection Officials best possible assessment of overall risk and in particular provide some indication of possible cost concerns.
- Concern: Even *Advanced Concepts* can fail during detailed design: PDR/CDR

Assumption: TMCO process is structured, objective, and aimed at highlighting foreseeable problems, however, <u>unforeseeable</u> problems can always emerge during Design and Development.

TMCO Principles

- **All Proposals will be reviewed to identical standards**
  - SSSO established in 1996 by OSS to support Discovery/Explorer but now handles Outer Planets, Code Y, and others (e.g.;GLAST)
  - The TMCO process is used by SSSO to support all OSS evaluations with a standard process.
  - Evaluation Plan approved by HQ and in place <u>before</u> proposals arrive
  - All proposals receive same evaluation treatment in all areas and by all reviewers
- **All evaluators be peers in the area of expertise that they evaluate.**

- **Basic Assumption**: Proposer is the expert on his/her proposal
  - **TMCO:** Task is to try to validate proposers' assertion of Low Risk
  - **Proposer:** Task is to provide evidence that the project is Low Risk

- **Goals:** For Proposal Evaluation (Science Driven); to eliminate High Risk proposals from consideration. For CSR evaluation (Implementation driven), to provide best possible risk evaluation to the Selection Officials.

Evaluation Criteria/Approach

Feasibility of Mission Implementation including Cost Risk

- Considers at least 5 interdependent Factors (these will have subfactors):
  - Mission Design/ELV
  - Flight Systems
  - Ground Systems
  - Management, Organization, Schedule
  - Cost

- For MOO's NASA will evaluate only the portions of the investigation that are funded by NASA including I/F's to Sponsoring Mission.

Since the objective of Proposal evaluation is to Select the most compelling Science investigations that are likely doable, proposers should provide adequate implementation information (even if in graphs/tables only) to assure that NASA can make this assessment.

TMC Evaluation Objective

The TMC evaluation is to determine, for each proposal, the level of risk of accomplishing the scientific objectives of the mission, as proposed, on time and within cost

Three levels of risk are typically defined: **Low Risk, Medium Risk and High Risk**

Low Risk: No problems that can not normally be overcome within the time and cost proposed. Problems not of sufficient magnitude to doubt the proposers likelihood to accomplish the Mission. "Envelope more than adequate"

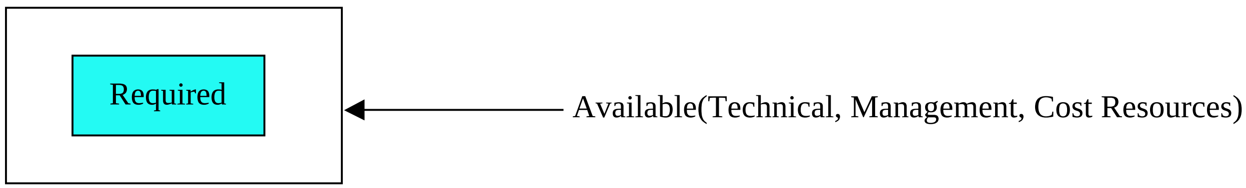
Medium Risk: Problems that make us somewhat uncomfortable, but are not sufficiently bad that the proposers can not overcome them with good management and application of engineering resources. Technology may not be sufficiently ready enough, but we think it can be done with time and money's (from known sources). Complexity is inherently risky but not too risky. Resources are tight but possible. "Envelope Tight"

High Risk: Major problems which make us expect failure. Insufficient resources to overcome the problems. "Does not fit in the Envelope"

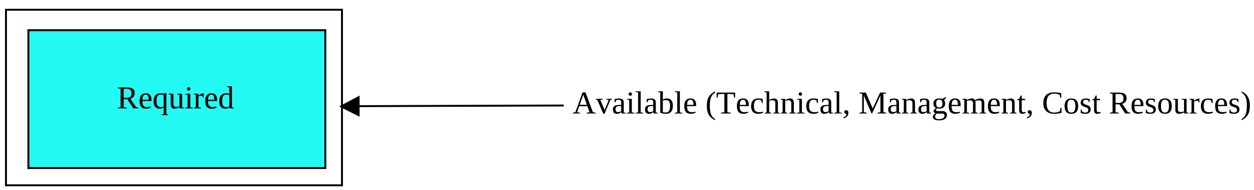
Envelope Concept

Envelope: All resources (TMC) available to handle known and unknown development problems. Includes schedule and funding reserves; reserves and margins on physical resources such as mass, power, & data; descope options; and fallback plans.

Low Risk: Required resources fit well within the available resources.



Medium Risk: Required resources fit, but just barely inside the available resources. Tight but likely doable.



High Risk: Required resources DO NOT fit inside available resources. **Expect the project to fail.**

TMC Independent Cost Assessment Pyramid

"The Pyramid"

<u>*Process Steps:*</u>

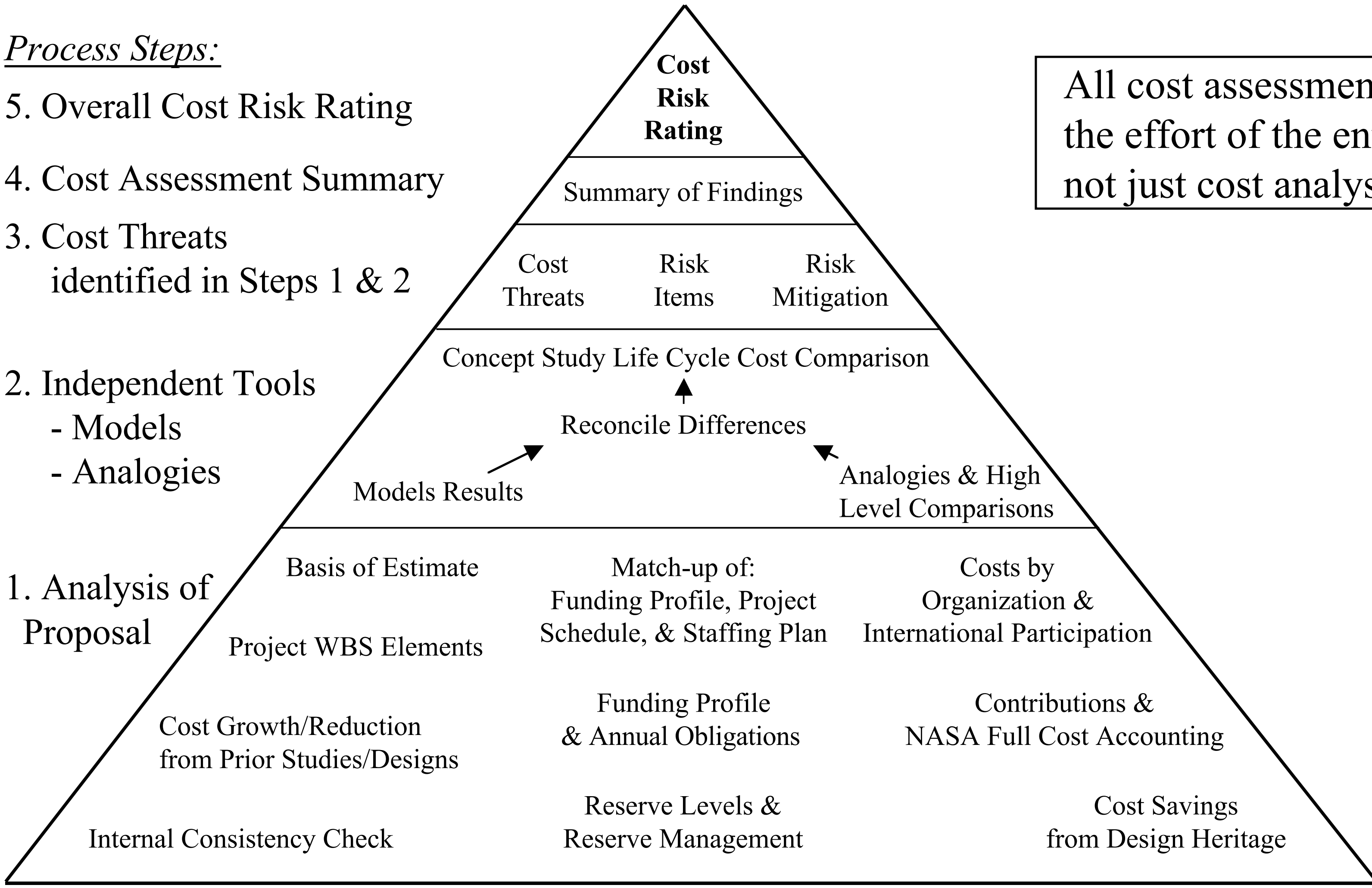
5. Overall Cost Risk Rating

4. Cost Assessment Summary

3. Cost Threats
   identified in Steps 1 & 2

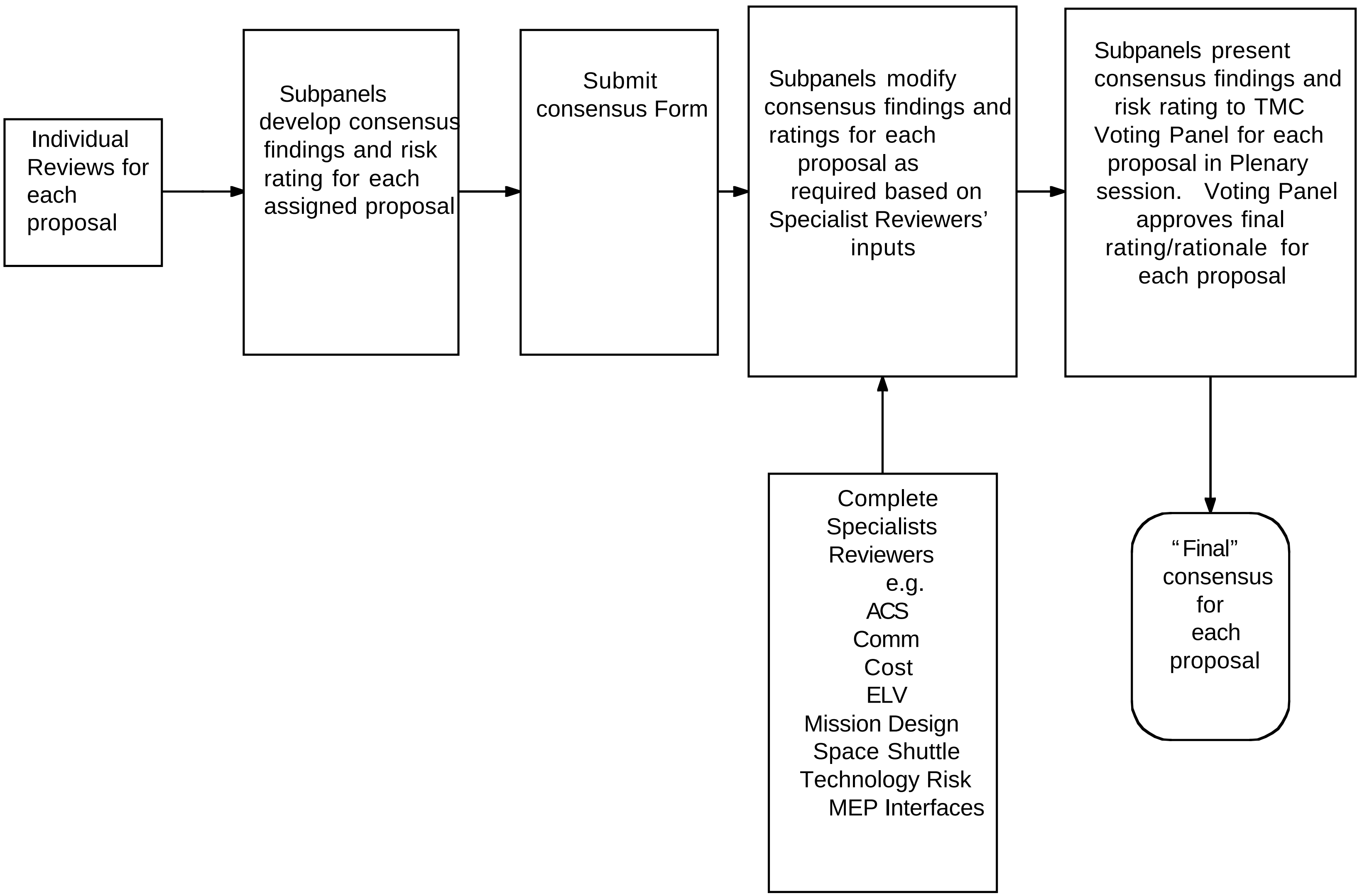
2. Independent Tools
   - Models
   - Analogies

1. Analysis of
   Proposal



All cost assessments are the effort of the entire TMC, not just cost analysts.

TMC Evaluation Flow



AO Options and Evaluation Expectations

Mission Investigations

o Feasibility of Implementation
  - -mission design
  - -spacecraft & interfaces
  - -ELV/Shuttle
  - -mission cost realism
  - -management
  - -ground system
  - -schedule
  - -I&T
  - -MEP interfaces
  - -etc

o Other Program Requirements
  - -commitment to E/PO program goals
  - -commitment to SDB program goals
  - -commitment to Tech Infusion/Xfer program goals (as applicable)

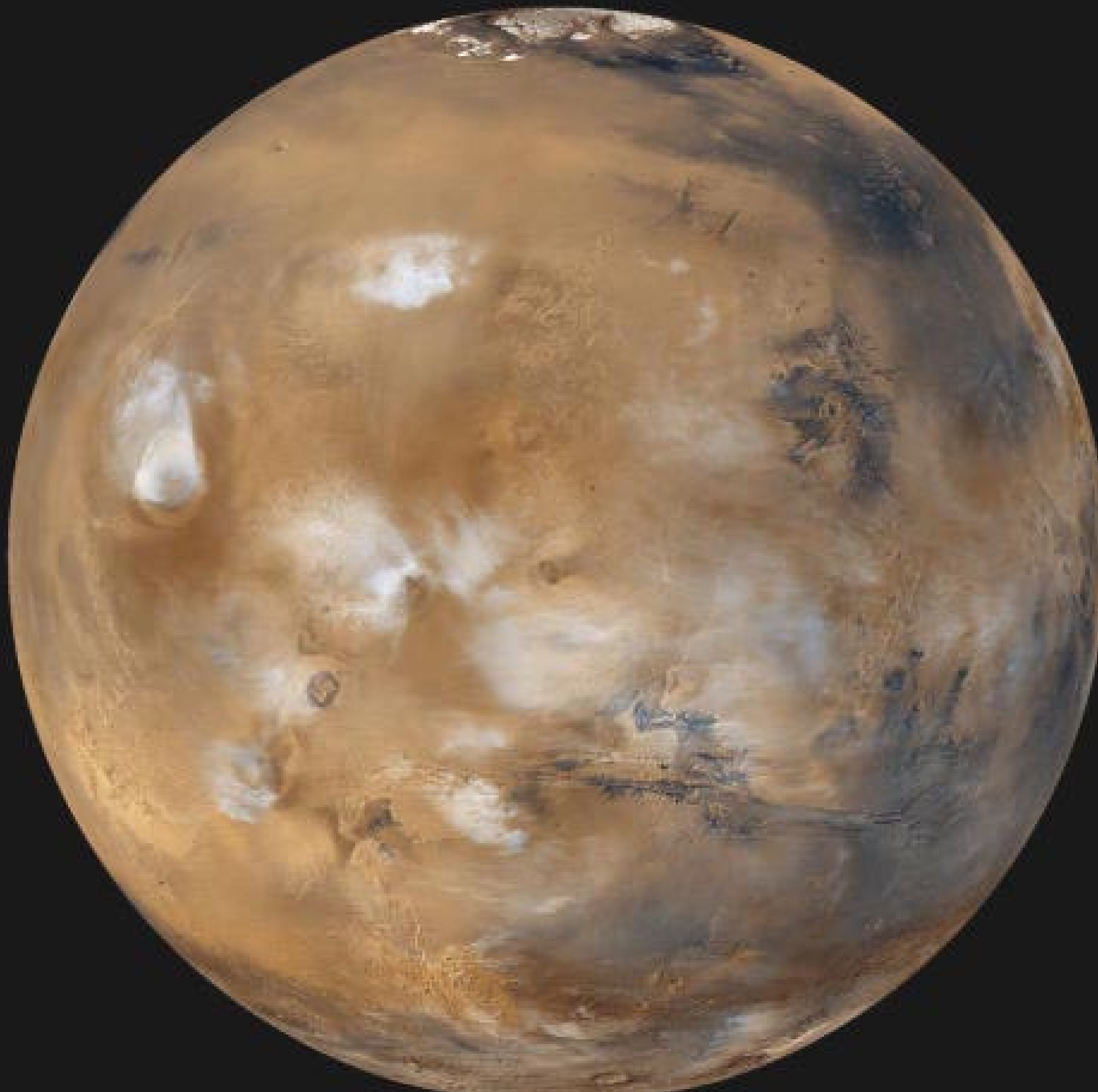
Missions of Opportunity Investigations

o Feasibility of Implementation*
  - -sponsors mission is not evaluated
  - -investigation spacecraft interfaces
  - -investigator invited for flight
  - -investigation cost realism
  - -investigation management
  - -investigation ground system (as applicable)
  - -investigation I&T (as applicable)
  - -define open design studies

o Other Program Requirements*
  - -commitment to E/PO program goals
  - -commitment to SDB program goals
  - -commitment to Tech Infusion/Xfer program goals (as applicable)

* Not assessed for data buy proposals.

Questions and Answers



Wrapup and Actions